Syllabus for 15-381: Artificial Intlligence
Representation, Problem Solving and Learning

Time:	Tuesdays and Thursdays 1:30 to 2:50pm	
Place:	Doherty Hall 2315	
Instructors:	Jaime Carbonell jgc@cs.cmu.edu	NSH 5419
	David Cohn cohn@justresearch.com	JPRC...
TAs:	Bryan Singer bsinger@cs	WeH 8203
	Ulas Bardak ubardak@andrew	
	Weng-Keen Wong wkw@cs	WeH 4112
	Chuck Rosenberg chuck@cs	WeH 7130
	Brian Bailey babailey@andrew	
	Greg Aist asit@cs	
Administrator:	Jennifer McGuiggan jenm@cs	NSH 4517
Texbook:	Artificial Intelligence: A modern Approach by Russell and Norvig, Prentice Hall, 1995 (Note: Lecture notes are very important too)	

Material Covered

The core content of Artificial Intelligence is covered, including: problem-solving and search, logic and knowledge representation, probabilistic reasoning methods, machine learning methods. Major application areas are explored briefly (natural language, information retrieval, machine vision, industrial optimization, etc.), as outlined in the class schedule.

Prerequisites

15-212 or equivalent computer-science proficiency is required. Some kowledge of algorithms (e.g. indexing, "big-O") and some mathematics (logic, probability, or linear algebra) will help. Ability to program well on your own is important.

Homeworks and grading

We expect to have 4 homeworks, 3 of which combine programming and problem-sets, and the last will be a team-based mini-project. We will have a midterm and a final examination. Grading will be as follows:

Homework	50% (includes mini-project)
Midterm	20%
Final	30%

Anyone with an A- or better average, including the mini-project homework (assuming it is turned in early enough for grading before the final), will be exempted from taking the final and will receive an A for the course. All others will take the final exam. So doing homework well, early and often is the best antidote to the otherwise inevitable end-of-semester crunch.

Class Schedule (subject to updates)

Jan 18	Carbonell	Introduction to AI, Administrivia, Problem Solving
Jan 20	Carbonell	Basic search methods: DFS, BFS, HC, HS, ...
Jan 25	Carbonell	Advanced search: Goal Reduction, MEA, A* ...
Jan 27	Cohn	Game-tree Search, A-B-pruning, Game Theory *Homework 1 handed out*
Feb 1	Cohn	Constraint Satisfaction & Scheduling
Feb 3	Carbonell	Propositional and Predicate Logic
Feb 8	Carbonell	Unification and Resolution in Logic
Feb 10	Carbonell	Representing Knowledge Beyond first-order Logics *Homework 1 due* *Homework 2 handed out*
Feb 15	Carbonell	Natural Language Processing
Feb 17	Carbonell	Knowledge-Engineering and Rule-Based Systems
Feb 22	Cohn	Probabilistic Reasoning
Feb 24	Cohn	Bayes Networks *Homework 2 due*
Feb 29	Cohn	Bayes Nets & Midterm Review
Mar 2		**Midterm Exam**
Mar 7	Carbonell	Information Retrieval: Vector Space Models
Mar 9	Cohn	Classification and Naive Bayes
Mar 14	Cohn	Intro to Machine Learning: Decision Trees *Homework 3 handed out*
Mar 16	Cohn	Overfitting and Model Selection
Mar 21	Cohn	Regression and Neural Networks
Mar 23	Carbonell	Other Supervised Learning and Applications *Homework 3 optional early hand in (for 10% extra credit)* *Mini-project (homework 4) launched*
Mar 28		**Spring break**

Mar 30		**Spring break**
Apr 4	Carbonell	Clustering and Unsupervised Learning
	Homework 3 due for real	
Apr 6	??	Enrichment lecture: Data Mining
Apr 11	Cohn	Optimization: Multivar HC, Simulated Annealing,...
Apr 13	Cohn	MDPs and Reinforcement Learning I
Apr 18	Cohn	MDPs and Reinforcement Learning II
Apr 20	Moore	Enrichment lecture: Optimization in Industry
Apr 25		Enrichment lecture: Autonomous Agents
Apr 27		Enrichment lecture: Speech Understanding
	Mini-project due	
May 2		Enrichment lecutre: Machine Vision
May 4		**Review for Final**

Note: Recitations will be scheduled on an as-needed basis, e.g. a few days before each homework is due, or to review a difficult topic, if there is sufficient demand as judged at the end of class.